

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

Constellation Program Launch Team Design Team Arianespace Benchmarking

Mike Leinbach
August 13-17, 2007

CxP Launch Team Design Team (LTDT)

- KSC-based, cross-functional team chartered to develop Launch Team concept for approval by CxP
 - Design long-term team concept, adapt as necessary for Ares 1-X, other specific implementation requirements/missions
 - LTDT chartered through first manned CEV launch.
 - Launch team concept will be “backwise adapted” for Integrated Test team, Daily Ops Test team
- Following conceptual design approval, will move into Implementation phase
 - Develop specific, detailed roles and responsibilities for team positions
 - Government vs. Contractor positions, or either, or both
 - Procedure development, training plan development, implementation method for CxP Requirements (How are “LCCs” going to be implemented?, etc.)
 - Physical Firing Room layout
 - Ensure Launch Team structure is compatible with other Program teams (“Launch Authority Team”, CoFR aspects, “FRR”, etc.)

LTDT Membership

Prime Team Members (2 each from stakeholder KSC Directorates)

- Constellation Program Office
- Launch Vehicle Processing
- ISS & Space Craft Processing
- KSC Engineering
- Safety & Mission Assurance
- Launch Services Program

Advisory Team Members (as required, sample list only)

- MSFC Resident Office
- Langley AVIO
- CxP Requirements Management Representative
- CxP Element Representatives
- Command, Control, and Communications Project
- Apollo launch operations
- JSC MOD
- Glenn Research Center (TBD)
- Human Factors Engineering
- Other NASA Center expertise

Accomplishments to Date

- Benchmarking Sessions Completed
 - Delta
 - Atlas
 - Wallops Flight Facility
 - JSC Flight Control Teams – Shuttle and heritage manned spaceflight ops
 - KSC Launch Teams – Shuttle and heritage manned spaceflight operations
 - Dryden Flight Research Center – civilian research aircraft operations
 - Edwards Air Force Base – military research aircraft operations
- Expect to benchmark Arianespace operations in August 2007

Reminder!

- The LTDT is seeking Program approval for CONCEPTUAL TEAM DESIGN for the entire Constellation Program at this stage.
- Following concept approval the LTDT will transition into the Implementation Phase where team specifics will be defined for Ares 1-X and follow-on missions.
 - The team will conduct in-depth “Lessons Learned” sessions following major activities for process improvements.

CxP Launch Team

- Design Philosophy – Form Follows Function
- Boundary Conditions
 - Keep it lean
 - Do what's right, not necessarily what's been done before
 - LV processed in LC-39; CEV processed in KSC Industrial Area
- Major Design Features
 1. Stage Integration
 2. One Single Launch Team
 3. GO / NO GO Philosophy
 4. Launch Authority Team (LAT)
 5. Stage Test Teams operational layout concept

CxP Launch Team Major Design Features

1. STAGE INTEGRATION – OVERALL TEAM DESIGN PRINCIPLE DETERMINATOR

- Flight hardware and ground support systems grouped by “stage” to align Launch Team structure with processing team structure, leveraging that expertise in the launch environment.
 - Launch Vehicle stage
 - Space Craft stage
 - Ground Support Systems stage
 - Each stage has it’s own fully-functional test team
 - Test management
 - Engineering
 - Safety & Mission Assurance
 - Problem identification and resolution is achieved within a stage (if possible). System/Discipline Engineering, Integration Engineering, Test Conductor, with S&MA insight, resolve issues with their stage test team.
 - Problems whose characteristics indicate effects may affect other stages (i.e., Launch Vehicle issue affects Space Craft readiness) are integrated at overall Launch Integration level
 - Launch Test Director
 - Launch Integration Engineer
 - Mission Assurance Manager
- while utilizing system/discipline engineering expertise from the stages for problem resolution.

CxP Launch Team Major Design Features

2. ONE SINGLE LAUNCH TEAM

- The Launch Team will be comprised of a single team with GO / NO GO authority, with subordinate (and functionally aligned) supporting team members
 - Prime Launch Team (PLT) – implementation of documented CxP Requirements, GO / NO GO authority. Located in KSC LCC FR 1 “Front Room”
 - Support Launch Team (SLT) – system/functional experts are an available resource to PLT members if requested. Located in KSC LCC FR1 “Back Room”
 - Extended Support Team – Design Center, Original Equipment Manufacturers Team – design expertise available to SLT / PLT if requested. Located external to FR 1.
- All team members with GO / NO GO authority will be located in the KSC, LCC Firing Room 1, Front Room (less off-site required functions like MILA, Range, MOD, etc.)

CxP Launch Team Major Design Features

3. GO / NO GO PHILOSOPHY

- GO / NO GO Authority will be granted to only those positions/persons with the responsibility and required expertise to commit their system/stage to launch
 - Significantly fewer GO / NO GO polls than Shuttle
 - No “Feel-Good” GO / NO GO polls
 - Prime Launch Team members can question specific Support Launch Team members if a concern exists, but NO formal poll. Likewise for the Extended Support Team members.
 - Expanding polls beyond those responsible for, and with the Authority to give the GO / NO GO dilutes meaning of the poll.
 - “Group Think”
 - “Feel Good”
- * Keep it lean. Keep it meaningful *

CxP Launch Team Major Design Features

4. LAUNCH AUTHORITY TEAM (LAT)

- The Launch Authority Team has overall launch authority and three principle responsibilities:
 1. Program Requirements change authority: “LCC, OMRS waivers” approval.
 2. Acceptance of previously undocumented programmatic risks. The “Challenger Effect” – issues that may be valid reasons to question the advisability of proceeding with launch.
 3. Acceptance of increased programmatic risks. Issues that may be valid reasons to proceed with launch even with some incremental risk increase
- Implementation of documented Program Requirements delegated to Prime Launch Team
- LAT membership includes senior Program, Project, and NASA programmatic, technical and Safety & Mission Assurance managers
 - KSC Launch Director, chair
 - Program Manager
 - Project Managers
 - Independent Engineering – NASA Chief Engineer, or designee
 - Independent Safety & Mission Assurance – NASA AA for S&MA, or designee
 - Mission Director – NASA Administrator or AA with overall NASA GO / NOGO authority. Agency perspective of advisability to proceed with launch.
 - Others (TBD)

CxP Launch Team Major Design Features

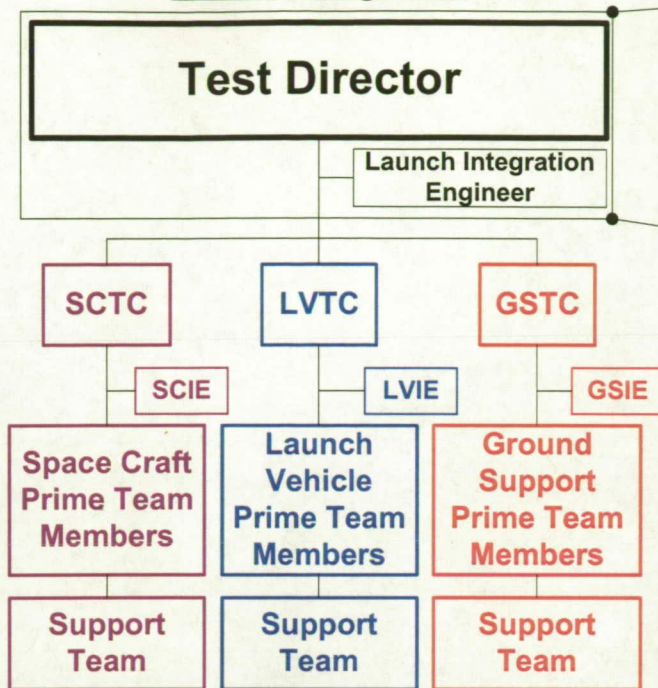
5. STAGE TEST TEAMS OPERATIONAL LAYOUT CONCEPT

- Stage Integration drives Stage Processing and Stage Launch Teams. Each stage test team has complete complement of required functions
 - Test Management
 - Engineering system/discipline experts
 - Integration Engineering
 - Safety & Mission Assurance professionals
- All team members co-located in “Test Team Pods” in the Firing Room. No gross separation of Engineering and Test Management functions
- Increased teaming human factors aspects
 - Stage ownership
 - Stage readiness for launch
 - Functional respect for team member responsibilities

Constellation Stage Concept

pg 1 of 2

Launch Integration



Reporting Structure for Nominal Countdown Operations

Test Director

- *Runs the Launch Countdown
- *Stage Test Conductors Report to Test Director
- *Integrates External Test Conductors (e.g., Range, Weather, MILA)
- *Polls the LIE and all Test Conductors
- *Asks Launch Director for Final "GO"

Launch Integration Engineer

- *Overall technical leadership
- *Integrates problems that span multiple stages.
- *Reports to the Test Director

Stage Test Conductors (SCTC, LVTC, GSTC)

- *Conducts single stage testing.
- *Raises stage issues to the Test Director.
- *Polls Prime Team Members and Stage Integration Engineers.
- *Reports to the Test Director

Stage Integration Engineers (SCIE, LVIE, GSIE)

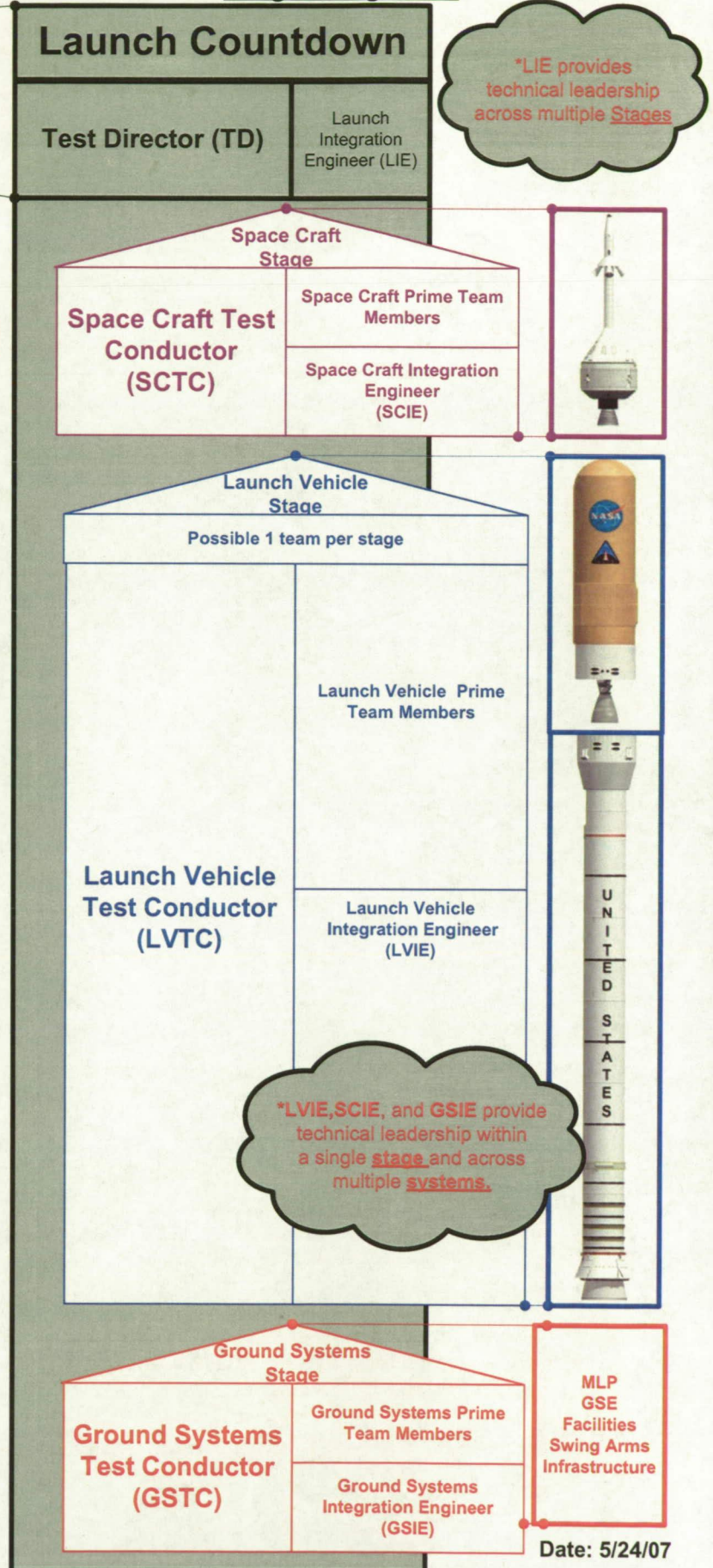
- *Integrates technical issues across single stage.
- *Is not required for single system issue, but will monitor.
- *Reports to the Stage Test Conductor.

Prime Team Members

- *System/discipline experts
- *Integrates Support Team inputs.
- *Reports to the Stage Test Conductor.

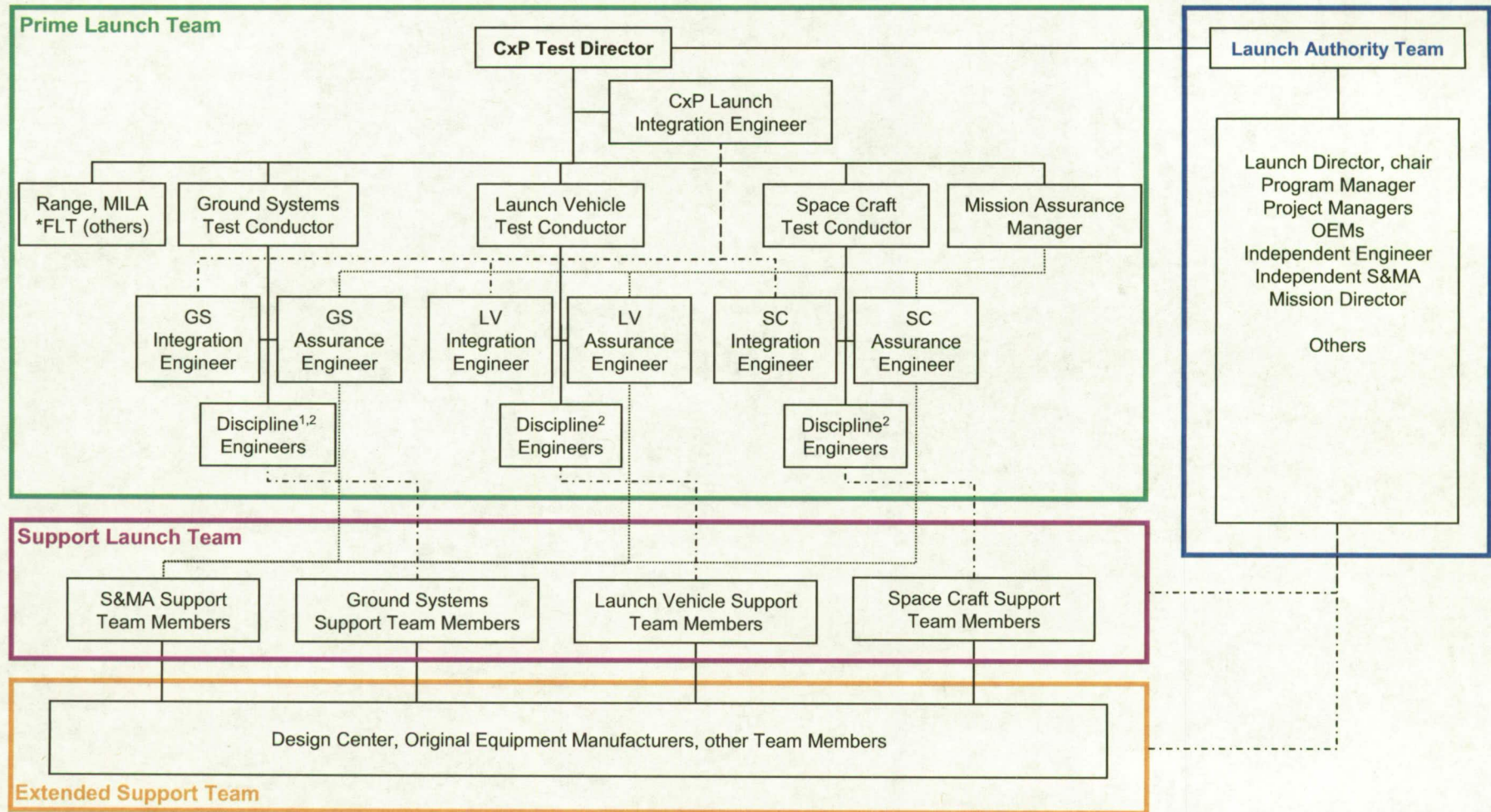
Contact KSC Launch Team Design Team
Mike Leinbach - Chair

Stage Integration



Date: 5/24/07

Constellation Launch Team Functional Reporting Protocol Concept (GO / NO-GO Polling)



Launch Management (CxP Test Director, CxP Launch Integration Engineer)

CxP Test Director polls

- Stage TCs
- CxP Launch Integration Engineer
- "other TCs" (MILA, ER, MAM, *FLT, others)
- Launch Authority Team

CxP Launch Integration Engineer polls

- Stage IEs for Anomaly Resolution

Stage Management (Stage TCs, Stage IEs)

Stage Test Conductor polls

- Stage System/Discipline Engineers²
- Stage IEs
- Stage Assurance Engineers

Stage Integration Engineer polls

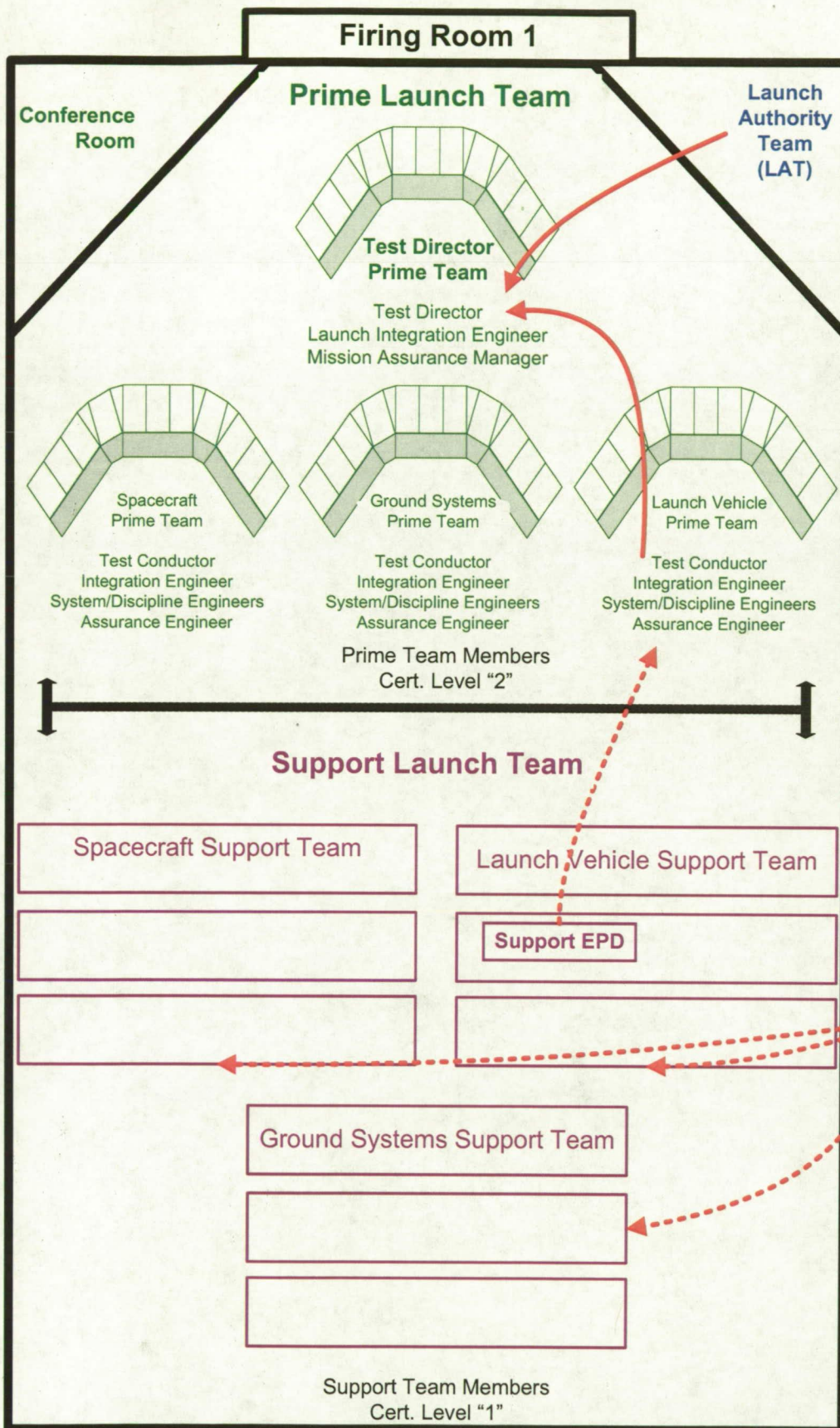
- Stage System/Discipline Engineers² for Anomaly Resolution

¹ Ground Systems Discipline Engineers includes Facilities, Comm, Command and Control

² Stage Discipline Engineers are a "shared resource" between Test Conduction and Anomaly Resolution

Stage Test Team Concept

pg 2 of 2



Launch Authority Team (LAT)

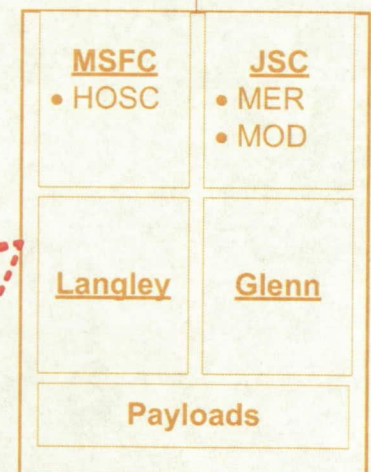
Members

- *Launch Director, Chair
- *Design Center / OEM Reps
- *Mission Director (Agency Representative)

Responsibility

1. Program requirements change authority.
2. Previously undefined programmatic risks (Challenger effect)
3. Accepting increased Programmatic Risk

- *Independent reporting capability
- *Previously undefined programmatic risk communication path
- *Not used to resolve issues



Prime Team Conference Room

- *Troubleshooting
- *Plan Development
- *Face to Face discussions

*VIPs will be located in LCC room 4P8, and / or OSB 2